

August 14, 2018

BY ELECTRONIC FILING

Marlene H. Dortch, Secretary Federal Communications Commission 445 12th Street SW Washington, DC 20554

Re: Amendment of Part 15 of the Commission's Rules for Unlicensed White Space Devices, ET Docket No. 16-56;

Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, ET Docket No. 14-165;

Amendment of Parts 15, 73 and 74 of the Commission's Rules to Provide for the Preservation of One Vacant Channel in the UHF Television Band For Use By White Space Devices and Wireless Microphones, MB Docket No. 15-146;

Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, GN Docket No. 12-268

Dear Ms. Dortch:

White spaces technology has a crucial role to play in bringing broadband connectivity to unserved rural communities. So far, Microsoft has partnered with local internet service providers to deploy white spaces broadband connectivity to over a half a million people in rural communities across the country. The two case studies attached to this letter detail some of these projects and illustrate the key role that white spaces technology can play in closing the digital divide and the homework gap. We have also enclosed announcements describing just some of Microsoft's white spaces broadband partnerships, bringing broadband access to rural areas of Maine, Maryland, Michigan, New York, Ohio, Virginia, and Wisconsin.

Each of these projects demonstrates the importance of white spaces spectrum in expanding rural broadband connectivity. The spectrum is currently unused, but, due to the special characteristics of these frequencies, can cover large areas with hilly terrain and dense tree cover. This makes white spaces technologies an ideal remedy for the challenges of deploying broadband throughout rural communities.

Sincerely,

Paul Caritj

Counsel to Microsoft Corporation

Ms. Marlene H. Dortch August 14, 2018 Page 2 of 2

Attachments:

Microsoft case study: Closing the Rural Digital Divide

Microsoft case study: Mid-Atlantic Broadband Communities

Microsoft press release: Agile Networks and Microsoft Announce Agreement to Deliver

Broadband Internet Access to Rural Communities in Ohio

Microsoft press release: RTO Wireless and Microsoft Announce Agreement to Deliver

Broadband Internet to Rural Communities in New York and Maine

Microsoft press release: Declaration Networks Group and Microsoft Announce Agreement to Deliver Broadband Internet to Rural Communities in Virginia and Maryland

Microsoft press release: Packerland Broadband and Microsoft Announce Agreement to Deliver Broadband Internet to Rural Communities in Wisconsin and Michigan





25.4 million

The number of
Americans who don't
have access to
broadband internet

10-20x

The increase in connection speed in Montmorency and Alpena Counties

2 million

The number of rural
Americans Microsoft has
pledged to cover with
broadband internet
access by 2022

Allband, Merit and Gigabit Libraries Network Montmorency and Alpena, Michigan, USA

25.4 million Americans lack access to basic, fixed broadband, which impedes their ability to pursue education and jobs. Without consistent and affordable internet access, 31% of rural America is at risk of being left behind.

The Microsoft Airband Initiative partners with local communities, internet service providers (ISPs), entrepreneurs and non-profits to bring digital access to unserved and underserved parts of the world, including less populated regions of the United States. By using unused television frequencies, called TV white spaces (TVWS), Microsoft and its partners are seeking to expand the reach and reduce the cost of internet access and help more customers affordably get online.

By partnering with Allband Communications, Merit Network and Gigabit Library Network, Microsoft is powering TVWS pilot projects to deliver Internet access—and 21st century opportunities—to residents, schools and anchor institutions in Michigan's Montmorency and Alpena counties.

Closing the homework gap

By collaborating with local schools, the TVWS initiative is helping close the "homework gap"—when children with no or slow internet struggle to do schoolwork at home. After all, 70% of teachers nationwide assign homework that requires internet to complete, so children living in areas with limited broadband are at an educational disadvantage.

By mounting a base station atop a water tower and connecting the service to Allband's fiber network, the initiative provides 360-degree coverage to more than 90% of the district's school bus routes. Now children traveling to and from school have the means to research papers or look into college, empowering them to pursue their full potential.

Bringing the internet home

Many of us take internet access for granted, but the digital divide excludes millions of Americans from economic opportunities. Microsoft is using novel approaches such as TVWS to make technology a force for economic inclusion.

Residents use roof-mounted receivers and wi-fi modems to access the TVWS signal, empowering them to take advantage of broadband-afforded opportunities. For example, one user in Alpena saw his internet speed jump tenfold via the Airband Initiative, which allows him to work from home.

Innovating small businesses

By installing internet-connected cameras on an elk preserve, Jack Matthias tracks the herds' movements and adds a marketing tool to promote his family-run business. Previously, his 160-acre property didn't have internet access, but with TVWS and solar-powered cameras on his property, he now keeps tabs on the animals' behavior, breeding and health. What's more, he plans to soon stream a live feed of the animals—both as a way to attract more visitors and as a way to share these animals with those who can't see them in person.

The Airband Initiative and its community partners look forward to expanding these programs in Northeastern Michigan—and beyond.

"We now have steady internet for the first time," says Dave J. Post, village manager of Hillman, Michigan. "TV white space technology can provide the type of service rural America craves."

About our partners

Allband Communications aims to bridge the digital divide by providing telephone, 911 and broadband access to Northeastern Michigan.

Gigabit Library Network operates a collaboration of libraries in service of education and civic engagement.

Merit Network, Inc. operates the country's longest-running regional network and provides connectivity to all Michigan's public universities.











Mid-Atlantic Broadband Communities

Virginia, USA

Connecting rural communities with affordable broadband



America's homework gap

A "homework gap" exists between students with high speed internet access and students without that same level of access. And, there are a lot of students without.

An estimated five million American households with schoolage children lack access to reliable broadband internet at home. In Southern Virginia's Charlotte and Halifax counties, that means 50 percent of students. Once the school day ends, students often lose access to the educational resources needed not only to complete homework assignments but also to prepare for success in today's workforce.

A multi-stakeholder approach

Microsoft partnered with Mid-Atlantic Broadband Communities (MBC), Adaptrum, B2X Online, and the Virginia Tobacco Region Revitalization Commission to address the homework gap. "Too many students in the U.S. are falling behind their peers because they lack reliable high-speed internet access at home," says Paul Garnett, Microsoft's Senior Director of Microsoft Airband Initiative. "Falling behind today means entering the job market at a serious disadvantage tomorrow. This innovative public-private partnership can help close that gap."

Homework Network closes gap

The solution to the homework gap is to ensure students, once home, have high speed access to the same online resources they have access to at school. The Microsoft Homework Network does just that, using an innovative broadband technology that takes advantage of unused low-band spectrum often referred to as TV White Spaces. To date, over 200 households are connected to high-speed internet, and more than 35,000 people are under coverage.

Connecting America's Unconnected Students

Today, nearly seven in 10 teachers across the U.S. assign homework and research requiring broadband access.

TV white spaces-based solutions can significantly reduce the initial capital and operating costs compared to the cost of using fiber or other fixed wireless technology alone.



How Microsoft Airband is enabling a more connected world

Public-Private Partnership Working together to close the gap.



The tech behind the solution

TV white spaces are unused broadband spectrum. One form of white space spectrum is in the traditional UHF and VHF broadcast spectrum. Regulators allow wireless devices to transmit on these unoccupied channels if they do not interfere with TV broadcasters and other licensed users. TV white spaces technology is ideal for servicing rural communities, as it can cover large geographies, hilly terrain, and locations with dense tree cover.

TV white space connectivity

Enables cost-effective broadband internet access to communities underserved by traditional offerings.

Helps disconnected students access learning tools to be successful in today's digital economy.

Provides a proof of concept to partners looking to differentiate their connectivity solutions in other key verticals.

The opportunity

By leveraging TV white spaces spectrum, network operators can cost-effectively deploy wireless networks that deliver fast, reliable, and affordable internet access in rural and underserved communities. Anchor institutions, such as schools and libraries with high-capacity connections, have a unique opportunity to solve America's digital divide by helping disconnected students and community members access the tools they need to be successful in today's digital economy.

The partnership model includes close collaboration across the school district, as well as local, state and/or federal government, with funding often coming from school districts, end users, grants, and subsidy programs.

Microsoft's Rural Broadband Strategy

Videos, white papers, and more about Microsoft's ideas for a new national rural broadband strategy.



Microsoft calls for U.S. strategy to eliminate rural broadband gap within 5 years

- "...just having the connection available is allowing these kids to work and do some different things outside of the normal, traditional hours."
 - Tad Deriso, Mid-Atlantic Broadband Communities



Agile Networks and Microsoft announce agreement to deliver broadband internet access to rural communities in Ohio

The agreement will leverage underutilized infrastructure in counties across the state, bringing high-speed internet access to 110,000 people in rural areas without broadband

CANTON, OH (AUGUST 8, 2018) — Today, <u>Agile Networks</u>, a leading provider of telecommunications solutions, and <u>Microsoft Corp.</u> announced a new agreement to bring broadband internet access to rural areas in Ohio, reaching 110,000 currently unserved people and greatly expanding access in underserved rural areas. The partnership is part of the Microsoft <u>Airband Initiative</u>, which is focused on closing the broadband gap by extending broadband access to 2 million unserved people in rural America by 2022.

This partnership leverages Agile's robust network of telecommunications infrastructure throughout the state and cutting-edge technology, including TV white spaces, to provide more people living in rural Ohio with access to broadband internet over the next four years.

"People across the state, no matter where they choose to live, work and send their children to school, should have the same access to strong, reliable broadband service," said Kyle Quillen, Agile Networks Founder and CEO. "This partnership will have an impact on more than 900,000 people across the state of Ohio, of whom 110,000 completely lack access to broadband. We're excited to partner with Microsoft as part of this national initiative to ensure everyone has access to the information they need, when they need it."

"In today's digital economy, broadband access has become a necessity across industries including healthcare, agriculture, business and education," said Shelley McKinley, Microsoft's head of Technology and Corporate Responsibility. "Our partnership with Agile will help deliver broadband internet access to rural communities across Ohio so that they can take advantage of today's and tomorrow's opportunities and the latest cloud technologies."

Across Ohio, there are critical functions in need of reliable, high-speed connectivity, including medical clinics and rural hospitals, schools, oil and gas wells, agriculture operations, and households. By equipping its towers with innovative TV white spaces equipment, Agile's efforts, in partnership with Microsoft, will enhance public safety interoperability across the state of Ohio, while providing competitive, affordable broadband access options to rural consumers and businesses, as well as turnkey solution sets tailored to fixed and mobile wireless carriers. As a result, this project will serve as a catalyst for economic development and rural broadband deployment in Ohio.

The Microsoft <u>Airband Initiative</u> is focused on bringing broadband coverage to rural Americans through commercial partnerships and investment in digital skills training for people in the newly connected communities. Proceeds from Airband connectivity projects will be reinvested into the program to expand broadband to more rural areas.

About Agile Networks

Agile Networks is the premier provider of hybrid fiber wireless broadband data networks, supplying connectivity to empower individuals and transform organizations. Agile Networks' hybrid network — The Agile Network — utilizes vertical infrastructure along with the latest in fiber-optic and wireless technologies to provide world-class data solutions. Engineered to the stringent specifications required to support public safety, The Agile Network boasts carrier grade performance and military-grade security. Agile's Last-Mile Agility makes delivering solutions to rural areas just as feasible as major cities

About Microsoft

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RTO Wireless and Microsoft announce agreement to deliver broadband internet to rural communities in New York and Maine

TV white spaces and other new technologies will provide affordable, reliable broadband access to approximately 290,000 people

REDMOND, Wash. — **July 24, 2018** — On Tuesday, <u>RTO Wireless</u> and <u>Microsoft Corp.</u> announced a new agreement to provide broadband internet access to more than 290,000 people living in unserved rural regions of New York and Maine. The partnership is part of the Microsoft <u>Airband Initiative</u>, which aims to extend broadband access to 2 million people in unserved portions of rural America by July 4, 2022.

Currently, 19.4 million people living in rural areas in the United States lack access to a broadband internet connection. RTO Wireless will use innovative techniques and technologies, including TV white spaces and Citizens Broadband Radio Service (CBRS), to deliver fixed and mobile wireless services to rural markets within the U.S., with initial rollouts across 16 counties in Maine and 20 counties in New York.

"Without reliable internet access, many people living in rural America are unable to take advantage of the same opportunities as their urban neighbors," said **Shelley McKinley**, Microsoft's head of Technology and Corporate Responsibility. "We are excited to partner with RTO Wireless to bring broadband to students, farmers, educators and business owners across the Southern Tier and North Country of New York and Western Maine so that they have an equal opportunity to learn, grow, contribute and prosper in the 21st century economy."

"The TV white spaces technology ecosystem championed by Microsoft provides a critical low-band function enabling tremendous RF propagation over a large service area," said **Steve Hubbard**, CEO of RTO Wireless. "Microsoft is contributing tremendous resources to solving the lack of broadband options in rural America. Joining the Microsoft Airband Initiative will enable RTO to enhance the educational, healthcare and agricultural services that can be provided to the rural communities. RTO is proud to launch its initial networks in New York and Maine with an impressive consortium of technology partners to deliver exciting applications and services."

This partnership between Microsoft and RTO Wireless will complement the already established and successful "broadband for all" initiative in New York. In 2015, Governor Andrew Cuomo and the state legislature established the \$500 million New NY Broadband Program, the nation's largest and most ambitious state investment in broadband expansion. Three rounds of grants using a reverse-auction method have expended this \$500 million and provided support to projects that deliver high-speed internet access to unserved and underserved areas of the state.

Leaders in New York have offered strong support for closing the rural broadband gap in the U.S.:

U.S. Rep. **Tom Reed**, District 23, said, "We care about the promotion of rural broadband, and this announcement will allow more hardworking people in our region to access the digital economy and quality, family-sustaining jobs. We will continue our work in Washington to promote broadband infrastructure through funding and fair regulation."

U.S. Rep. **Chris Collins,** District 27, said, "New York's 27th Congressional District is 65 percent underserved by broadband technologies, and it is welcome news that RTO Wireless and Microsoft are taking action to expand service in five of the counties I represent. As a member of the Energy and Commerce Committee's Subcommittee on Communications and Technology, I've been able to work on policies that will help bring more broadband to rural America. We still have a long way to go in making sure all of Western New York has reliable access to broadband, but I commend Microsoft for its investment in our area that will benefit thousands of my constituents."

U.S. Rep. **Elise Stefanik**, District 21, said, "This is excellent news, and I applaud Microsoft and RTO Wireless for working to bring broadband to our district. Increasing access to broadband is critical to ensuring our businesses can compete, our economy can grow and our children have access to the best educational resources. At the federal level, I am pleased to be a leader on expanding access to rural broadband and will continue to work to ensure the North Country has access to this critical 21st century infrastructure."

U.S. Rep. **Claudia Tenney**, District 22, said, "Broadband internet access unlocks pathways to better education, business growth, health and so much more. Microsoft and RTO Wireless' new agreement to bring broadband to underserved rural regions of New York, including to people in the 22nd District, ensures our community can take advantage of the opportunities offered by today's digital economy."

The Microsoft <u>Airband Initiative</u> is focused on bringing broadband coverage to rural Americans through commercial partnerships and investment in digital skills training for people in the newly connected communities. Proceeds from Airband connectivity projects will be reinvested into the program to expand broadband to more rural areas.

About RTO Wireless

RTO Wireless is a "Rural Technology Operator" who has solved a unique set of operational and economical constraints plaguing rural broadband & narrowband connectivity, by incorporating the latest wireless connectivity technologies across TV White Space, CBRS, LoRaWAN and traditional spectrum bands. RTO is founded by executives with vast experience building and operating neutral host and wholesale wireless affiliate & roaming networks for top tier mobile operators. In 2018, RTO's financial commitments to new wireless infrastructure construction has exceeded \$150,000,000. RTO is building wireless infrastructure for rural communities to access fixed broadband services and IoT applications, including middle mile backhaul connections to serve education, healthcare, public safety, utilities, asset tracking, precision agriculture, connected vehicles, and environmental applications. RTO's neutral host rural networks enable dynamic partnerships with IoT ASPs, wireless

carriers and wireline/cable operators in need of higher capacity rural network footprint. More information can be found at www.rtowireless.com.

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Declaration Networks Group and Microsoft announce agreement to deliver broadband internet to rural communities in Virginia and Maryland

The project will expand Declaration Networks' broadband network, providing access to currently unconnected people, using TV White Spaces and other technologies

REDMOND, Wash. — **April 24, 2018** — On Tuesday, <u>Declaration Networks Group Inc. (DNG)</u> and <u>Microsoft Corp.</u> announced a new agreement to deliver broadband internet access to approximately 65,000 people on the Eastern Shore of Virginia, including Accomack and Northampton Counties, and Garrett County, Maryland, over the next three years. This partnership is part of Microsoft's <u>Rural Airband Initiative</u>.

There are 19.4 million people living in rural America without broadband access, including nearly 30 percent of the people in rural Virginia and 6 percent of the people in rural Maryland. Under its NeuBeam™ brand, DNG delivers high-speed internet and voice services using a combination of advanced wireless technologies, including TV White Spaces. Microsoft and DNG aim to address the rural broadband gap for residents and businesses, allowing unserved regions to fully participate in the digital economy through access to technology and services that will enable farmers, healthcare professionals, educators, business leaders and others in the community.

"This partnership with Declaration Networks will help close the rural broadband gap for 65,000 people living on the Eastern Shore of Virginia and in Garrett County, Maryland," said Shelley McKinley, Microsoft's head of Technology and Corporate Responsibility. "Broadband is essential for agriculture, education, business and healthcare. Microsoft's Airband initiative is focused on bringing this necessity to 2 million people in rural America by 2022 and accelerating the national priority of closing the broadband gap."

"DNG and Microsoft share a commitment to establishing quality broadband solutions for rural America," said Bob Nichols, CEO of DNG. "Our partnership reflects a shared vision that focuses on an effective plan to align stakeholders, technology and resources for a sustainable path to address the digital divide."

Closing the rural broadband gap is strongly supported by Virginia and Maryland leaders:

Virginia Gov. Ralph Northam said, "As a native of the Eastern Shore, I am thrilled that Microsoft is taking action to bring new broadband connectivity to communities that need it. This new effort, in addition to ongoing efforts in state government, will help bridge the digital divide. Connecting rural communities will help create jobs,

grow our economy and improve our quality of life. I am happy to celebrate this positive step forward as we work to make our commonwealth work better for all Virginians, no matter who you are or where you live."

Maryland Gov. Larry Hogan said, "Reliable access to high-speed internet is critical for Maryland's small businesses, families and students to thrive in our 21st century economy. We are working diligently to eliminate the rural broadband gap and ensure that all Marylanders have the opportunity to access trusted, cost-effective broadband solutions."

U.S. Sen. Mark R. Warner said, "Millions of Americans, particularly in rural America, lack broadband access — a precondition to meaningful participation in the digital economy. That's millions of people unable to participate in e-commerce, enroll in online courses, receive tele-health services, and get on-demand services. It also means millions of people unable to hone programming skills, engage in telework, or modernize rural industries with broadband. Broadband access doesn't guarantee a community success, but not having it guarantees that companies aren't going to even consider you. I applaud efforts like these that seek to close the digital divide, including through innovative last-mile services."

U.S. Rep. John K. Delaney said, "As the only former CEO of a publicly traded company currently serving in Congress, I know how critical it is to position our businesses, workers and families to best compete in a global digital market. Closing the broadband gap is a critical piece of successful education, entrepreneurship and innovation, and I applaud DNG and Microsoft's investment in the communities of Garrett County."

U.S. Rep. Scott Taylor said, "We live in a digital age, where the internet is no longer considered a luxury but a necessary part of everyday life. The widespread lack of internet on the Eastern Shore and across rural Virginia makes these populations especially vulnerable by limiting their access to education, medicine and information services. Thanks to DNG and Microsoft, we can finally begin the process of expanding broadband networks throughout rural Virginia to equip residents, businesses and professionals with the tools needed to succeed in a 21st century economy."

In addition to commercial partnerships with local companies like Declaration, Microsoft's <u>Rural Airband Initiative</u> includes digital skills training for people in newly connected communities and access to royalty-free patents. Proceeds from Airband connectivity projects will be reinvested into the program to expand broadband to more rural areas.

About Declaration Networks Group

DNG successfully deploys and operates broadband local access solutions in underserved markets with a combination of advanced fiber and wireless to deliver high speed Internet and voice services to residential and business customers. DNG is a recognized leader in developing sustainable broadband eco-systems through cooperative local partnerships that leverage combined resources towards shared goals, to increase access to affordable, quality broadband service and allowing customers to "connect to what matters." For more information, please visit www.declarationnetworks.com and www.neubeam.com.

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Packerland Broadband and Microsoft announce agreement to deliver broadband internet to rural communities in Wisconsin and Michigan

The project will extend Packerland's network, delivering broadband access to approximately 82,000 people in underserved areas, utilizing TV White Spaces, Wi-Fi and other technologies.

WASHINGTON — **Feb. 25, 2018** — At the National Governors Association's winter meeting in Washington, D.C., Microsoft President Brad Smith announced a new agreement between <u>Packerland Broadband</u>, a division of CCI Systems Inc., and <u>Microsoft Corp.</u> to provide broadband internet access to approximately 82,000 people living in rural regions of northern Wisconsin and the Upper Peninsula of Michigan over the next four years.

People with access to broadband have better educational, business, agricultural and health care opportunities. Unfortunately, for the more than 19.4 million people living in rural communities across America without broadband access, these opportunities remain out of reach. The Packerland-Microsoft partnership will bring essential broadband services to the region, where on average more than 43 percent of people living in rural Wisconsin and 34 percent of people living in rural Michigan lack adequate access to broadband, and the economic and educational opportunities it enables. The Packerland partnership is part of Microsoft's TechSpark Wisconsin program to introduce digital initiatives, including the Rural Airband Initiative, to foster greater economic opportunity and job creation in northeast Wisconsin.

"This partnership with Packerland Broadband will help us address the rural broadband gap in northern Wisconsin and Michigan's Upper Peninsula," said Brad Smith, president of Microsoft. "Broadband has become the electricity of the 21st century, essential for education, business, agriculture and health care. Microsoft's Airband Initiative is focused on bringing this necessity of life to 2 million people in rural counties by 2022."

"Partnering with Microsoft allows us to bring new services and push our services further into the rural landscape in our region and beyond," said Cory Heigl, vice president of Packerland Broadband. "We are the people we serve, and in this part of the world, we want to make an impact for the better. Our partnership with Microsoft will help us to influence lives by improving at-home education, enhancing economic opportunities, keeping up with health care advancements and furthering the agricultural innovation of our rural communities."

"The mission of TechSpark Wisconsin is to bring new digital solutions to our region," said Microsoft TechSpark Wisconsin Manager Michelle Schuler. "Packerland

Broadband and Microsoft are making it possible for people living in rural Wisconsin to have the same opportunities to live, learn and work as people living in connected cities. That's win-win for the people living here and the region's economy."

CCI Systems, Inc. CEO John Jamar said, "We have been focused on making life better by connecting people through innovative communications networks, and we are enthused to team up with our friends at Microsoft to accelerate that."

Packerland will use a mix of technologies to provide broadband to its customers in rural communities, including TV White Spaces and Wi-Fi hardware developed with support from Microsoft, to extend the reach of its existing hybrid fiber-coax and wireless delivery platforms. Packerland expects to cover approximately 33,750 people by the end of 2019, and approximately 82,000 people by 2022. As part of the Packerland-Microsoft project, Packerland will provide Windows devices, Office 365 and other cloud-based services to small businesses, consumers and students, as well as digital literacy skills training. Packerland will also leverage Microsoft Azure as part of its operations management.

Microsoft is an advocate for closing the rural broadband gap in the U.S. Through its Rural Airband Initiative, Microsoft aims to deliver broadband to 2 million people by 2022 through commercial partnerships with local companies like Packerland, leveraging a mixture of technologies including TV White Spaces, and through patent sharing. The initiative also includes digital skills training for people in newly connected communities. Proceeds from Airband connectivity projects will be reinvested to provide additional rural areas with broadband.

About Packerland Broadband

Packerland Broadband was founded in 2007 as a division of *employee owned* CCI Systems, Inc. and is based in Iron Mountain, Michigan. The mission has been to provide *reliable high-speed connectivity to rural areas*, striving to service this population and enabling them to access internet services that fit their lifestyle. With a vision of bridging the digital divide, Packerland delivers modern telecommunications services to more than 60 rural communities throughout Wisconsin and the Upper Peninsula of Michigan. For more information, visit www.packerlandbroadband.com.

About Microsoft

Microsoft (Nasdaq "MSFT" @microsoft) is the leading platform and productivity company for the mobile-first, cloud-first world, and its mission is to empower every person and every organization on the planet to achieve more.

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